Work

p. 128 #1 $\vec{F} = 21\,N$ assume horizontal unless otherwise told

$\Delta\vec{d} = 3.2\,m$

$W = \vec{F}\Delta\vec{d}$

$= 21(3.2)$

$= 67.2\,J$

#4 $W = 3.2\,kJ = 3200\,J$ $\quad W = \vec{F}\Delta\vec{d}$

$\Delta\vec{d} = 1.8\,m$ $\quad 3200 = \vec{F}(1.8)$

$\vec{F} = ?$ $\quad \vec{F} = 1777.8\,N$

#5 $m = 4.4\,kg$ uniform $\vec{v}$

$\vec{F} = 8.1\,N$ $\quad W = \vec{F}\Delta\vec{d}$

$W = 5.9\,J$ $\quad 5.9 = 8.1\,\Delta\vec{d}$

$\Delta\vec{d} = ?$ $\quad \Delta\vec{d} = 0.73\,m$

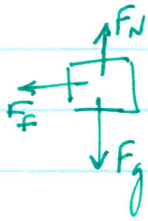
p. 129 #8

$m = 0.85\,kg$

$\Delta\vec{d} = 0.65\,m$

$\vec{v}_2 = 0\,m/s$

$\mu = 0.38$

a) 

$F_g = mg$ $\quad F_N = F_g$

$= 8.33\,N$ $\quad = 8.33\,N$

$F_f = \mu F_N = 0.38(8.33)$

$= 3.17\,N$

b) $W = ?$ $\quad W = \vec{F}\Delta\vec{d}$

$\Delta\vec{d} = 0.65\,m$ $\quad = -3.17(0.65)$

$\vec{F}_f = -3.17\,N$ $\quad = -2.06\,N$

#9 $m = 0.150\ kg$

$\Delta\vec{d} = 2.0\ m$

(a) 

$\vec{a} = 0\ m/s^2 \Rightarrow \therefore F_a = F_g$

$= mg$

$= 1.47\ N$

(b) $W = \vec{F}\Delta\vec{d}$

$= 1.47(2)$

$= 2.94\ J$

#10 $W = 5000\ J$

$\Delta\vec{d} = 2.0\ m$

a) $\vec{F} = ?$ $\quad W = \vec{F}\Delta\vec{d}$

$5000 = \vec{F}(2)$

$\vec{F} = 2500\ N$

b) 

$F_g = F_a = 2500\ N$ $\quad \therefore F_g = mg$

$2500 = m(9.8)$

$m = 255.1\ kg$

#11 $W = 400000\ J$

$m = 4500\ kg.$

$\Delta\vec{d} = ?$

$W = \vec{F}\Delta\vec{d}$

$400000 = \vec{F}\Delta\vec{d}$

$400\,000 = 4500(9.8)\Delta\vec{d}$

$\Delta\vec{d} = 9.07\ m$

$\because F_a = F_g$, $\quad F_a = mg$

$= 4500(9.8)$

#12 The student does 0 J of work as he pushes on the tree since the tree does not move.

#13 Once again, no work is done. The meteor is travelling at a constant speed. In space, there is no friction and, in the absence of gravity, an FBS would look like: □
There are no forces → NO WORK

#14 There is no work done here. The applied force acts at 90° to the displacement. Thus $\cos 90° = 0$ & $W = \vec{F}\vec{\Delta d}\cos\theta$
$= 0$ J.

#15 In order for work to be done
(1) There must be a force and,
(2) There must be a displacement and,
(3) A component of the force must act in line with the displacement.

p.131 #1 $\vec{F} = 32$N $\quad W = \vec{F}\vec{\Delta d}$
$\vec{\Delta d} = 7.8$m $\quad = 32(7.8)$
$W = ?$ $\quad = 249.6$ J

#2 $\vec{\Delta d} = 36$m $\quad W = \vec{F}\vec{\Delta d}$
$\vec{F_a} = mg = (\text{your mass})g$ $\quad = (\text{your mass})(9.8)(36)$
$W = ?$ $\quad =$

p: 131 # 3 $m = 325\,t$

$= 325000\ kg$

$W = ?$

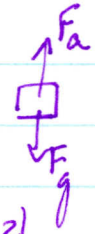
$\Delta\vec{d} = 9.2m$

$W = F\Delta d$

$= F(9.2)$

$= (325000)(9.8)(9.2)$

$= 2.93 \times 10^7\ J$



$F_a = F_g = mg$

$= 325000(9.8)$

#4 $W = 740\ J$

$\Delta\vec{d} = 3.4m$

(a) $W = \vec{F}\Delta\vec{d}$

$740 = F(3.4)$

$F = 217.6\ N$

(b) $F_a = F_g = mg$

$217.6 = m(9.8)$

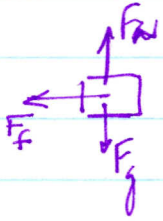
$m = 22.2\ kg$

#5 $m = 1300\ kg$

$\mu = 0.97$

$\vec{V}_2 = 0$

$\Delta\vec{d} = 27m$



$F_f = \mu F_N$

$= \mu mg$

$= 12357.8\ N$

$W = \vec{F}\Delta\vec{d}$

$= (-12357.8)(27)$

$= -333661\ J$